MICHIGAN ENVIRONMENTAL SCIENCE BOARD

SONAR INVESTIGATION PANEL
MEETING SUMMARY
THURSDAY, JANUARY 14, 1999
MARRIOTT FAIRFIELD INN
7799 CONFERENCE CENTER DRIVE
BRIGHTON, MICHIGAN

PANEL MEMBERS PRESENT
Dr. Bette J. Premo, Chair
Dr. Cal McNabb
Dr. Ted R. Batterson
Mr. Keith G. Harrison, Executive Director

MDEQ/OSEP SUPPORT STAFF PRESENT
Mr. Jesse Harrold, Environmental Officer
Ms. Patricia Hiner, Executive Secretary

I. CALL TO ORDER

Dr. Bette J. Premo called the meeting of the Michigan Environmental Science Board (MESB) *Sonar* Investigation Panel (Panel) to order at 9:00 a.m.

Dr. Premo reviewed the charge to the Panel. The Governor had requested the assistance of the MESB in reviewing the current conclusions of the Michigan Department of Environmental Quality (MDEQ) regarding the use of the herbicide, fluridone (*Sonar)*. These conclusions were that a balanced, diverse aquatic plant community should be maintained, and *Sonar* should not be used at the labeled rate to eliminate all plants in a body of water. Also, when *Sonar* is used to control Eurasian watermilfoil, negative impacts on native aquatic plants should be minimal. Effective concentration is five to eight parts per billion (ppb) and effectiveness can be enhanced by a boost at 10 - 14 days. The MDEQ has also determined that *Sonar* is one tool for controlling Eurasian watermilfoil and does not have a direct negative impact on fish or wildlife populations, or on any human health concerns when used according to the product label.

II. EXECUTIVE DIRECTOR'S UPDATE

Mr. Keith Harrison provided a brief summary of the material that had been submitted to the Panel to date. He also indicated that one Panel member, Dr. John Gracki, was ill and would not be attending the meeting. Mr. Harrison reminded the audience that meetings of MESB Panels are meetings held in a public forum rather than public hearings. There would be opportunity, however, for public comment. Comments and opinions based on data would be given strong consideration by the MESB.

III. PRESENTATIONS

Mr. Ned Rathburn (Inland and Wetlands Unit, MDEQ) provided an overview of how the MDEQ became involved with *Sonar*. He stated that the goal of the MDEQ's Aquatic Nuisance Control Program is to control those plants that are causing a hardship to recreational users or a detriment to public health. The state is responsible for protecting its waters and maintaining a healthy, balanced, and diverse aquatic plant community for fish and wildlife. Vegetation management must balance the needs of water users with the need to protect the natural resources. A major nuisance problem in Michigan lakes is the presence of the exotic plants, Eurasian watermilfoil and curlyleaf pondweed. They form heavy surface mats that impede surface water activities, and are aggressive invaders that hinder the growth of native plant species.

Sonar is a systemic herbicide that is absorbed from the water by the growing shoots of the plant, and from the hydrosoil by the roots. It inhibits the plant's ability to produce the carotenoid pigments that protect the chlorophyll, allowing the chlorophyll to be degraded by the sun. The plant cannot manufacture food and dies. Tools used for the control of Eurasian watermilfoil include 2,4-D and *Reward,* as well as *Sonar.* There is a danger of contamination of groundwater supplies and private drinking water wells with the use of 2,4-D. *Reward* is a broad-spectrum, contact herbicide, but it does not kill the entire plant. It cannot be used for full lake treatments to control large Eurasian watermilfoil infestations because it also controls the other plants it contacts.

The MDEQ Inland Lakes and Wetland Unit has completed approximately 400 field assessments regarding 87 *Sonar* treatments on 52 lakes between 1990 and 1996. Data gathered consisted of qualitative observations and not quantitative studies such as biomass or plant count. Chemical calculation data are estimates based on the calculated volume in the upper 10 feet of the lake using contour maps that are several years old. Chemical concentrations were computed, rather than measured.

The data are shown as cumulative cover, or the sum of the percent coverage of each plant species. This should not be confused with the amount of the littoral zone covered with plants. Different architectures, growth forms, or niches result in a considerable potential for overlap of the percent coverage for individual species.

Sonar was introduced in 1987. Partial treatments at 150 parts per billion (ppb) indicated that *Sonar* was a broad spectrum herbicide, killing most plants through the entire lake. In 1991, five treatments at 15 to 46 ppb removed most rooted plants for one or more years. Since then, limited treatments have been permitted to determine the best concentration to provide the desired control. Concentrations ranged from seven to 38 ppb in 1992, eight to 22 ppb in 1993, and five to eight ppb in 1994 to 1998. In 1992 and 1993, Eurasian watermilfoil was controlled in all areas of all lakes except where the *Sonar* was flushed out. However, many non-targeted, native plants were lost in most lakes for one year or more. Of the 24 lakes treated in 1993, five lost up to 30 percent of their non-targeted submerged plant species, twelve lakes lost from 30 to 60 percent, and seven lost from 70 to 100 percent during the treatment year and following

year. Native plants most consistently removed included: coontail, Elodea, naiads, and the native milfoils. Besides the exotic curlyleaf pondweed, native plants that increased after treatment included Sago pondweed and water stargrass, as well as possibly wild celery and flatstem.

It was thought that a concentration below 10 ppb might selectively remove Eurasian milfoil and not damage native plants. In 1993, the MDEQ selected a concentration of eight ppb for evaluation, limiting treatments in 1994 to four lakes previously treated with *Sonar*. In 1994, the *Sonar* Quality Action Team (QAT) was assembled to evaluate and recommend *Sonar* treatment application options, develop guidelines for use of *Sonar* in Michigan lakes, and recommend ways to prevent misuse of the product. From December 1994 to November 1996, the QAT directed the selectivity evaluation, selecting six lakes that were treated at eight ppb in 1995 and 10 lakes that were treated with eight ppb in 1996. Of the 20 lakes evaluated from 1994 to 1996, nine had previously been treated with *Sonar* at higher concentrations.

Eurasian watermilfoil was eliminated within six to eight weeks in the eight ppb treatments, with minor populations reappearing the year after treatment. Five ppb treatments in Dixie and Merritt Lakes in 1994 reduced the Eurasian watermilfoil cover, but did not eliminate it. Evaluation of the results of these treatments was complicated by the low native vegetation coverage and the low number of native species found. Vegetation increased from the previous year, when treatments had been 10 to 14 ppb, and increased again the following year, when no additional *Sonar* treatments occurred, but species diversity remained very low.

Inconsistent results were obtained in 1995 from treatment of six lakes at a calculated rate of eight ppb. Lake Lansing's cumulative cover of native vegetation declined in the year of treatment and increased the following year. However, native vegetation cumulative cover increased at Selkirk Lake in the treatment year, decreasing the next year. Crooked Lake showed initial increase in cover and then returned to pre-treatment levels. These lakes had no previous *Sonar* treatments. Of the lakes that had received previous treatments, data on pre- and post-treatment vegetation were incomplete and could not be used for evaluation.

Ten lakes were treated with *Sonar* in 1996. In lakes without previous treatment, native plants declined an average of 59 percent following treatment. The average number of native species declined from eight to six after treatments of five ppb, and from almost 11 to only five native species after treatments of eight ppb. Previously treated lakes that were treated with five ppb *Sonar* had an average decline in native cumulative cover of about 55 percent.

The conclusions reached by the MDEQ were the result of this evaluation as well as research conducted by the Army Corps of Engineers (ACOE) and SePRO Corporation and literature reviews.

Dr. Premo asked whether the calculation of *Sonar* concentrations in the studies used

the same method that would be used for determination of permit requirements. Mr. Rathburn responded affirmatively. The volume of the lake is determined and then the amount of chemical needed is calculated. In these tests, actual measurements are not taken and it is unknown whether the target concentration is actually reached or whether an unknown factor such as a heavy thermocline inhibits mixing. Dr. Premo then asked why the top 10 feet was typically used as the volume indicator**.** Mr. Rathburn answered that this was due to Eurasian watermilfoil being located near the shoreline and shallow water, and the difficulty in measuring of the thermocline. Ms. Diane Klemans (Land and Water Management Division, MDEQ) added that it was a practical consideration as most contour maps are measured in five foot increments. The calculations are the same as those used by contractors in determining treatment doses. However, to date, there has not been any correlation by laboratory analysis of calculated and actual concentrations.

Dr. Ted Batterson asked whether the herbicide was uniformly applied or only in the littoral area. Mr. Rathburn said that efforts are made to distribute the chemical evenly throughout the surface of the lake. Also, treatments typically are completed early in the spring when the plants are growing rapidly. Ms. Klemans indicated that temperatures at the time of application were recorded in several of the 1997 and 1998 applications. This information should help determine if there was a thermocline at that time, and if so, whether the product was distributed below it.

Dr. Cal McNabb asked about the level of cumulative cover that would be necessary to sustain a healthy fish population. Mr. Rathburn answered that it was preferable to have between 20 and 40 percent of the littoral zone vegetatively covered for a healthy fish and wildlife population. There is an attempt to keep around 40 percent of the littoral zone vegetated; preferably with native plants.

Dr. Kurt Getsinger (ACOE) presented a summary of the research on *Sonar* that had been conducted during the past 18 years. He stated that the goal of this research was to eliminate some of the problems of a monoculture of an exotic species, and to encourage a more diverse community, with restoration of desirable plants. Restoration difficulties are related to the degree of Eurasian watermilfoil infestation. Ideally, in the treatment year, the Eurasian watermilfoil is removed and a community of native plants is left. However, excessive amounts of Eurasian watermilfoil might require higher rates of *Sonar*, which will also remove more of the native vegetation. But even at relatively high rates of 20 to 25 ppb, the water is not sterile and the vegetation will return in the following year. The concerns about excess removal of vegetation led to efforts to lower the rates to a point that would eliminate weed species like Eurasian watermilfoil and leave the native plants. Less use of herbicide would also make sense from an economical standpoint.

Selective control of submerged plants includes various factors related to the molecular structure of the chemical and how it affects the plants. It is influenced by the life cycles of target and non-target plants, as well as contact time in the water. Treatment in water is more difficult than on land because the water is not static. Flow and thermoclines will

have an impact, as well as formulation and size of the treatment area. Using controlled environmental chambers, mesocosm systems, and field sites, concentration levels and exposure times were examined for various aquatic herbicides. The mesocosm systems included 2,500-gallon tanks with communities of rooted plants. For most products, a very short contact time was needed with high concentrations. Plant control was also possible at low doses, but with an extended exposure time. Studies across the country, as well as in Michigan, were used for verification of the research results. Data gathered are used to make recommendations for actual product implementation by users.

Research on *Sonar* has been conducted since 1981, and has resulted in a current recommendation of 10 to 25 ppb for 60 to 90 days. The maximum label rate applied to Eurasian watermilfoil is 150 ppb. When that dose was applied and left on for three weeks, the plants appeared to die. However, flushing of the chemical and application of fresh water resulted in a recovery to pre-treatment levels. This indicated that it was not the dose as much as the contact time that was critical. A series of studies was then conducted using mesocosm systems to find the minimum effective level. Concentrations were measured daily, and the problem of chemical degradation was eliminated by the blockage of ultraviolet light. At concentrations of four ppb and below, there was stunting of plant growth but not death, for any length of exposure. A mesocosm study was conducted on mixed species to look at selectivity issues related to timing. Rates of five ppb, which was felt to be the threshold, and 10 ppb were used, with treatments in April and in May. With increasing rates there was decreased selectivity. At five ppb, 99 percent of the Eurasian watermilfoil was eliminated while other plants were healthy and growing. At 10 ppb, there was more damage to native plants. Timing was a factor with earlier treatment resulting in better selectivity.

Research on the use of *Sonar* in Michigan has involved the cooperation of the ACOE with the MDEQ, Pat Sarano of Michigan State University, the Michigan Aquatic Managers Association, the Michigan Department of Natural Resources, Michigan Lake Associations, and Michigan *Sonar* distributors. John Madsen is the plant ecologist with the ACOE who did much of the work putting the study together.

Dr. Premo asked what made Eurasian watermilfoil a target species. Dr. Getsinger said that it is a very fast growing plant with considerable surface area, and it is sensitive to *Sonar*. Studies in Michigan focused on Eurasian watermilfoil and on curlyleaf pondweed, another species that has caused similar problems. Two treatments and two reference lakes were selected in each of the western and eastern zones of the state. They were about 100 to 500 acres in size, and had a vegetative cover heavily dominated by Eurasian watermilfoil with a fairly good diversity of native species. Maintenance of a five ppb *Sonar* level would be maintained for 60 to 90 days using boost applications. Water residue sampling was completed at six shallow stations, distributed through the littoral zone of the lake (Due to the expense, water residue sampling had not typically been done in earlier studies.). Standard measurements of *Sonar*, such as high performance liquid chromatography (HPLC), were compared to the new assay developed by SePRO. Two deep stations were also selected for each lake to help define the thermocline. The application rate was based on the same format that

used the 10 foot contour to calculate the volume of the lake. This 10 foot contour is the main vegetative zone of the lake. Treatment was begun in May 1997.

Big Crooked was one of the lakes treated. One day after treatment, residue levels were at three ppb and subsequently started to tail off. The boost treatment was given and levels rose, but was still low. This would be expected to give some Eurasian watermilfoil control with little effect on native plants. Vertical profiles showed residue levels in the upper layer that fell off when the deeper water was measured. Stratification due to the thermocline inhibits mixing into the lower lake levels. Mr. Paul Houser (Progressive Engineering) explained that weather had been unusual during the test period. A warmer winter had been followed by a cold and windy spell during the spring. This caused the thermocline to break down, and be at a measured depth of about 28 feet at the time of treatment. This caused the product to be mixed down deeper, and resulted in lower concentrations than might be expected. Wolverine Lake also showed lower than targeted levels, with a changing thermocline.

Statistical analysis on approximately 500 samples showed a good correlation between *FasTEST* data and standard measurements of *Sonar*. The *FasTEST* assays, which are available commercially for $85.00 each, have the results measured within 48 hours. Prompt analysis of *Sonar* concentrations is a useful tool for measuring the movement of the chemical through the water and documenting cause for the effects seen.

Methods used to study the *Sonar* included division of the lake into grids of 150 to 200 points. Surveys were conducted with pretreatment in May and follow up in August. Changes in the plant community were observed with records made of the species seen as well as the depth and number of species present. An estimate of percent cover was made, however, biomass was not collected. Comparisons were made between May 1997 and May 1998, and between August 1997 and August 1998. Adequate control was achieved in the treated lakes, other than Wolverine Lake, which had very low readings. For example, Lobdell Lake had a 40 percent frequency of Eurasian watermilfoil in May 1997, which was basically eliminated, and then returned to just 10 percent in May 1998. Wolverine Lake had very little residue and there was not much reduction in the year of treatment. There was actually an increase in Eurasian watermilfoil the following year, reflecting the increase seen in the untreated lakes. Native plants stayed healthy, and in some cases increased. After the removal of Eurasian watermilfoil, vegetative cover remained above 50 percent. Information is not available on the status of the lakes two years after treatment.

A second study, in 1998, examined the treatment of two lakes, Eagle and Lower Scott. These lakes were shallower than those treated the previous year, with possibly less diversity. They were chosen partially due to their availability. The first application was set at six ppb with a boost at 14 days. Dr. Getsinger clarified that a boost consists of enough product to bring the concentration back up to the target level, and not a complete reapplication of the original amount. Results were close to six ppb on day one at Eagle lake, but almost 14 ppb at Lower Scott. Although that was higher than expected, later levels were lower and a high level on one day will not have an impact on

either the exotic or native species. Data at three months, in August, showed only a 25 percent reduction of Eurasian watermilfoil. This is possibly due to increased mass of Eurasian watermilfoil in the lakes this year due to the warm water. The Eurasian watermilfoil fell out of the water column in late June, and there was no impact on the recreation. Native plants decreased, but remained in acceptable amounts. It will be important to check the lakes this spring, to see what mass of Eurasian watermilfoil returns.

Dr. Getsinger stated that a slightly higher rate might ensure that concentrations do not drop too low to control the Eurasian watermilfoil. This is the rationale for what is called a straight eight, a one time application of eight ppb. In other states, there have been situations where Eurasian watermilfoil had infiltrated the lake to the almost complete elimination of native plants. Higher rates of *Sonar*, such as 15 ppb, were used to rid the lake of Eurasian watermilfoil. The assumption was that after a year or two the system would recover with a return of native species. Dr. Premo asked about the usual time frame for reinfestation by Eurasian watermilfoil. Mr. Jorgensen (Aquatic Technologies) replied that there is no consistency, with each lake having its own ecosystem. Some lakes are still free of Eurasian watermilfoil 10 years after treatment, while others see a return in two years.

Dr. Batterson asked whether any of the studies had examined the effects of varying pH on the effectiveness of the herbicides. Dr. Getsinger replied that pH had been shown not to affect the activity of the *Sonar*. Dr. Batterson asked if a correlation between warm temperatures and increased plant activity accounted for the degree of variation between lakes. Dr. Getsinger answered that the condition of the Eurasian watermilfoil plant in a given year was important, including reserves of nutrients in the root crown. Susceptibility of native plants varies by species, with Elodea quite sensitive, coontail somewhat sensitive, and Vallisneria rather tolerant. There was no evidence that eradication of the Eurasian watermilfoil encouraged infiltration of the curlyleaf pondweed. There was an increase of curlyleaf seen in two of the treated lakes, but this was also seen in several of the untreated lakes.

Dr. Batterson questioned the status of the lakes in July. Dr. Getsinger acknowledged that *Sonar* kills the Eurasian watermilfoil slowly. This results in better quality, but treatments need to be started earlier in the year to have the plants gone before the fourth of July weekend.

Mr. Mark Coscarelli (MDEQ) mentioned the large impact on native plants that occurred in 1995 when levels at Lake Lansing were eight ppb. It was felt that this greatly affected the fish population. Dr. Getsinger replied that that would be a surprising result since at the level of application mentioned, an impact on the native plants would not be expected. Mr. Jorgensen stated that he had applied the *Sonar* to Lake Lansing in 1995. He said that this lake had not been highly managed and for years previous, there had been two to three hundred acres of Eurasian watermilfoil on the lake. It is possible that the Eurasian watermilfoil had an impact on reducing the biodiversity, and when the Eurasian watermilfoil was removed the natives were not there to recover. Dr. Getsinger

added that in a situation like this, if the lake population of vegetation is limited and you want to eliminate the Eurasian watermilfoil, then an assessment needs to be made as to whether it is necessary to either replant native vegetation or leave some of the Eurasian watermilfoil in place to provide habitat for the fish and other wildlife. Because any Eurasian watermilfoil left will tend to multiply and dominate the lake, perhaps complete eradication should be the goal.

Dr. Getsinger mentioned a treatment plan developed in 1991 for Long Lake in Seattle, Washington. A formerly healthy native plant population was being smothered with Eurasian watermilfoil. In order to eradicate the Eurasian watermilfoil as much as possible from the lake in the first year of treatment, 25 ppb of *Sonar* was maintained in the lake for 90 days. He noted that this was not yet a monoculture as the native plants were still viable. He added that restoration of a lake involved replacement of other plants, and not just removal of Eurasian watermilfoil.

Dr. Premo asked for clarification on the correlation between the *FasTest* and HPLC data. Dr. Getsinger responded that there was a small difference; perhaps 20 percent between the two sets of data, but that there was a consistent correlation. The numbers in the HPLC were lower than those of the *FasTEST* data. These were both quantitative tests, with the recovery of the *FasTEST* about 95 percent and the recovery of the HPLC 92 percent. Concentrations measured included field spikes with four ppb. Tyler Koschnick added that the detection limit of *FasTEST* was one ppb.

Dr. Getsinger concluded by saying that, although he felt that a treatment of six ppb with a boost back to this level was adequate, further testing would be helpful. A series of studies at five, six, seven, eight, nine, and 10 ppb would give a more complete picture of the possibilities. Adequate coverage could reduce the number of treatments in subsequent years.

IV. PUBLIC COMMENT

Doug Pullman (Aquest) mentioned that Dr. Marty Sparks of Central Michigan University had been a graduate student involved in the HPLC analyses, and could be a useful source of information. Mr. Pullman added that Lobdell Lake was a good example of where higher rates of *Sonar* were used in the early 1990's.

Norm Ziron (Aquatic Nuisance Control) stated that in the early 1990's they had used treatments of between 12 and 20 ppb, and had eradicated the Eurasian watermilfoil for at least five years. He added that in 1996, eight ppb had not achieved 100 percent Eurasian watermilfoil control.

Holly Madill (Rain and Water Quality Specialist, Michigan United Conservation Club) addressed some of the policy-related concerns of the members of her group regarding *Sonar*. One was the subsequent invasion of curlyleaf pondweed after removal of the Eurasian watermilfoil. Ms. Madill also expressed concern that there was no monitoring of the amount of *Sonar* that was being put into the lakes.

Ray Van Gothem (Michigan Aquatic Managers Association) stated that his organization, a group of commercially certified applicators, was committed to the best management of Michigan's aquatic resources and had contributed significant financial resources to the investigation of the use of *Sonar*. He affirmed the belief that *Sonar* could be used as a herbicide to protect aquatic resources. Mr. Van Gothem also stated that the riparian property owners who have funded *Sonar* applications have generally been pleased with the results that included enhanced recreational opportunities as well as an increase in biodiversity. Some clients were not satisfied with extremely low application rates, which failed to control the target species, or were not effective until after the fourth of July. Mr. Van Gothem suggested that reasonable outcomes should be the goal of regulatory agencies, and not strictly specified dose rates for *Sonar*. Some openness to dose rates could allow for adjustments based on subsequent research.

Scott Jorgensen asked about the fact that *FasTEST* assays have shown concentrations in the water that are consistently below targeted levels. He questioned whether the 10 foot contour measurement should be arbitrarily changed to a deeper level, or if the actual thermocline should be determined at time of treatment. Correct calculation of lake volume would help to produce more consistent results. Dr. Premo asked if anyone had ever calculated the average thermocline depth in Michigan lakes. Mr. Howard Wandell replied that information from the MDEQ indicated that it was about 20 feet later in the year, but that it had not been calculated for spring.

Jason Brooks (Professional Management) stated that after Eurasian watermilfoil is removed, there are other tools available, such as harvesting, to deal with the possibility of increased curlyleaf pondweed. Harvesting is not a suitable option for Eurasian watermilfoil elimination.

Paul Houser (Progressive Engineering) stated that the best treatment for balancing control of Eurasian watermilfoil, with the least damage to non-target species has been the split six treatments. He added that there is a slim margin between a successful treatment and either an overdose or an inadequate dose. So there needs to be careful volume calculation and close monitoring of *Sonar* concentrations.

Mike Netherland (SePRO) stated that cost could become an issue if the lack of a thermocline resulted in a greater volume of water to be treated. However, the evidence on *Sonar* showed that the treatment had greater efficacy if applied early, before the biomass had a chance to accumulate.

V. PANEL DISCUSSION

Dr. Premo reemphasized the need for a lake management plan to be developed whenever any chemical is used in the water. She stated that although chemicals are one method for managing lakes, they treat the symptoms rather than the problem. These problems include fertilizer use or other activities in the watershed area. Dr. Batterson added that requirements for a lake management plan were developed when

the QAT was first assembled in 1994. Dr. Premo said that the other issue that concerned her was knowing the actual concentrations that were being achieved in the lakes. She stated that *FasTEST* might prove to be a useful tool and requested that anyone with more information on this assay provide it to the Panel. Dr. Premo added that it was important to fine tune the formula for calculating concentrations, with *FasTEST* or HPLC, so that calculated levels would be closer to actual concentrations.

Dr. Premo questioned the difficulty of obtaining temperature and dissolved oxygen measurements in order to determine the thermocline. Mr. Jorgensen responded that many permit applicants do not have the equipment to perform these tests because they are not required. Contour maps and volume calculations were required, but not a temperature profile. He stated that if this testing would provide needed information, that it would be possible to purchase the equipment and to learn how to use it properly. Ms. Klemans stated that she would send information on the MDEQ vegetation management plan requirements to the Panel.

Dr. Batterson asked if the depth contour maps, which had been marked in five-foot increments, would be available in a digitized format to allow for more precise calculations. Ms. Klemans said that the current base maps are obtained from the Michigan United Conservation Club, and Ms. Madill added that they supplied the maps, but did not produce them. Mr. Jorgensen stated that the quality of the maps varied. They could be 40 years old, and in some cases the contours had changed. Mr. Craig Smith (Professional Management) concurred that the maps were very old, and of varying accuracy. Production of modern, accurate maps would take considerable work, more than just a few spot checks with depth finders. He added that the thermocline is not well developed early in the spring, and can change between testing and application of the product. Mr. Norm Ziron suggested that a 15-foot contour would be a better basis. Dr. Batterson stated that the littoral zone of each lake should be used for volume calculations, however, this would require accurate depth contour maps.

Mr. Harrison expressed concern that application of this product was based on a knowledge of the thermocline, which was not obtainable. Mr. Smith responded that a correlation analysis between outcomes and calculated dose rates was used to establish the basis for the 10-foot contour determination. He agreed that the methods were not as precise as they could be. Dr. Premo questioned the time frame from permit request to actual application. Ms. Klemans answered that it was a short time, with requests in January and after for that spring. She added that once the permit application was complete, the MDEQ had 15 working days to either issue or deny the permit. The past two years, applicators had been allowed to add a boost treatment. This was still allowed, but with some extra requirements.

Dr. Getsinger stated that changing thermoclines and weather underscored a need for flexibility. He added that the chemical would mix throughout the lake in a few days, but that an even application across the lake would allow for prompt measurement of the concentrations obtained. Mr. Jorgensen stated that *Sonar* should be applied by mid April to have control by the fourth of July holiday, although this was dose related.

Stating that it was not important that the plants be conspicuously present, Dr. McNabb asked how often the boost treatment could be applied. Mr. Jorgensen answered that it was currently done 14 to 17 days post treatment. One issue has been posting a notice at the lake. While it does require extra labor, it should not be a real problem. At five and six ppb, the chemical is below the US Environmental Protection Agency's drinking water tolerance level, and the sign could simply state that a treatment has occurred and no restrictions are applied. Actual wording on the sign depends on conditions imposed by the MDEQ, such as a 24-hour restriction on swimming, or possible fish consumption restrictions.

Dr. Batterson asked why a 10 ppb concentration with a single boost was preferable to keeping levels low for longer periods of time. Dr. Getsinger responded that it was due to the costs of having to come back and retreat a number of times. He stated that an application of 10 ppb would result in lower actual concentrations with a gradual downward decline from there, but with possibly enough coverage from one application. Levels of between 10 and 20 ppb can be hard on some native plants, but extra boosts of lower levels can give better control. Levels of 6 ppb for at least a couple of weeks at the beginning, and then maintenance of a minimum level should control Eurasian watermilfoil without harming native plants. A higher initial rate can give a quicker knockdown of the Eurasian watermilfoil, and eradication of the problem for several years could be preferable to annual treatments at low levels.

Dr. Batterson questioned the use of *Sonar* AS, the aquatic suspension. He noted that the MDEQ's initial conclusions did not specify this form of *Sonar*, except in the sixth of their seven points. Ms. Klemans responded that this product was new in Michigan. Dr. Getsinger added that continuing research was being conducted on the uptake of this chemical by plants.

Dr. Batterson asked whether anyone had taken water samples from Lake Lansing at the time of treatment. Mr. Jorgensen responded that as *FasTEST* was not available at that time and that the calculations were theoretical rather than actual. Also, there was no pretreatment survey done during the previous year. The day before the treatment, the QAT surveyed the lake for Eurasian watermilfoil and native plants. The Eurasian watermilfoil was not prevalent at that time. Mr. Jorgensen added that native plants can also be a nuisance, with the species varying by year. Curlyleaf can be a problem after treatment of exotics, with naiads and celery coming in as the water warms up. Chara is also a problem, especially around beaches and docks. However, Chara is an algae and not susceptible to *Sonar*.

Ms. Klemans commented that the Michigan Department of Natural Resources Fisheries Division had been gathering data on fish populations in the treated lakes. Mr. Harrison suggested having a representative from that division provide its findings to the Panel. Dr. Getsinger said that this information should be available at the end of the month. Dr. Premo concurred that this would be useful information.

Regarding the preliminary conclusions of the MDEQ, Dr. Batterson characterized the first three as almost intuitively obvious. Maintenance of a diverse plant community with native species present was essential, and control of exotic species was obtainable at an order of magnitude less than that specified on the label, or even less. There are also data to show that there are no direct toxic effects to humans or wildlife. Therefore, determining the validity of points four, five, and six of the Governor's letter should be the focus of the Panel's further investigation. Since water samples from the lakes that have been treated were not preserved, validation of the actual concentrations is not possible.

Mr. Howard Wandell stated that since the introduction of *FasTEST* several lakes were treated that were not part of the ACOE evaluation. Data from these lakes indicates actual levels that were both above and below the calculated concentrations. Ms. Klemans stated that samples were collected and analyzed separately. She added that the number of sampling locations varied with the size of the lake, but the sampling times were stated in the permit protocol, and were all done at 24 hours. Dr. Getsinger stated that the timing of the samples was critical. A level of 14 ppb one day post treatment was not problematic, while the same concentrations after 60 days would be. High levels may indicate inadequate mixing time, rather than faulty calculations.

Ms. Klemans noted that the permit stated how much product would be allowed, rather than a maximum concentration in the water. She clarified that if testing at 24 hours post treatment showed concentrations above the maximum allowed, this would technically be a violation of the permit. She added that she would send the Panel the information on what constitutes a complete permit for *Sonar*, as well as other herbicides. Dr. Batterson asked what would stop an applicator from using extra product if no one from the MDEQ was there to ensure compliance. Mr. Dick Hinterman answered that an applicator received a set fee, based on the contract, and would not be likely to use extra product for financial reasons. Mr. Smith added that *FasTEST* was not just a research tool, but could be used to monitor compliance and product concentrations.

Mr. Harrison questioned whether it was common to treat a lake with another herbicide in the same year that *Sonar* is applied. Dr. Getsinger replied that this was possible, for spot treatments of localized problems. Ms. Klemans added that this was kept to a minimum. Efforts were made to document the specific problem before allowing the additional treatment. Mr. Harrison asked what the chance was of an algal boom after *Sonar* treatments. Ms. Klemans said that most permits include use of an algaecide. Ms. Klemans stated that 1,200 herbicide permits were issued in the previous year. Of these, about 20 were for *Sonar*. Most of the rest was for compounds such as *Reward* to control native plants. Mr. Rathburn added that *Sonar* was the product usually chosen for full-lake treatments, while products, such as *Reward,* were used for a smaller area.

Dr. Batterson asked about the timing of the Panel's report in regards to implementation of regulations by the MDEQ. Ms Klemans agreed that there was not a need to rush judgment on this issue as permits for the current year would be processed according to

the interim strategies in place. Levels of six ppb with a boost back to six ppb would be allowed as well as a straight eight ppb treatment. The target species here is Eurasian watermilfoil, as well as duckweed in some small ponds. *Sonar* could also possibly be used in the fall to control curlyleaf pondweed.

Tyler Koschnick agreed to distribute actual labels for the product. He added that a treatment had been done this past fall at a concentration of 12 ppb to kill curlyleaf and Eurasian watermilfoil. Measured concentrations were about nine ppb with levels staying near seven after a month. This was in a Michigan lake of over 200 acres. Treatment was completed in October to impact the life cycle of curlyleaf, which can germinate in the fall.

VI. PANEL ASSIGNMENTS

Dr. Premo said that specific assignments would not be made until the Panel had received the remainder of the available information.

VII. NEXT MEETING DATE

Although the next meeting had already been tentatively scheduled for March 17, it was decided to wait until the Panel had had a chance to read the additional, expected material before determining the need for an additional meeting.

VIII. ADJOURNMENT

The meeting was adjourned at 3:00 p.m.

Respectfully submitted,
Keith G. Harrison, M.A., R.S., Cert. Ecol.
Executive Director
Michigan Environmental Science Board